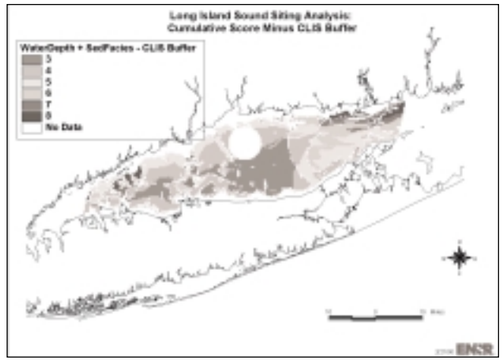
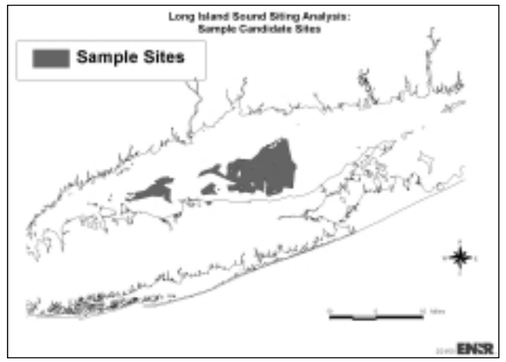
A similar process has been used below to remove cumulatively scored cells from the previous gradational factor maps that impinge on fatally flawed areas



Finally, in the map at right, the remaining areas of highest suitability have been outlined and isolated as new candidate sites or ZSF's for further investigation.



This application of automated GIS tools can be easily be repeated at each stage of the site selection process with different factors, scores, and weights until consensus is reached that the results appropriately reflect both scientific knowledge of the Sound and value judgements about what characteristics of the Sound are most important in disposal site selection.

For more information, please contact Ann Rodney, US EPA, 1 Congress Street, CWQ, Boston, MA 02114-2023 (617) 918-1538 rodney.ann@epa.gov or visit our website at www.epa.gov/region01/lisdreg.

Fact Sheet - October 1999

United States Environmental Protection Agency

US Army Corps of Engineers
New England District

Long Island Sound Dredged Material Disposal EIS

Evaluation Factors Scoring Example

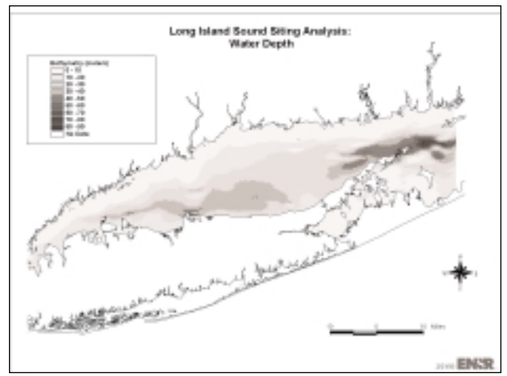
Example of Scoring

Provided separately is an example of how a GIS database can be applied to the evaluation and screening of disposal alternatives.

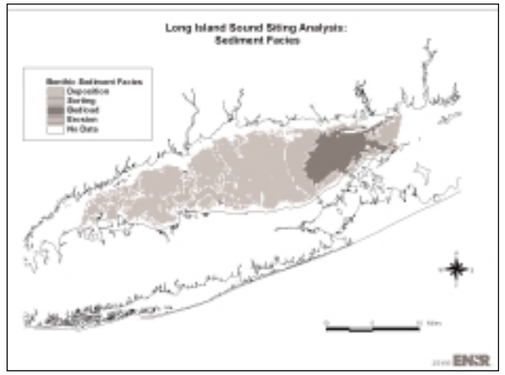
An important component of the site selection prcoess is the iterative progression from identification of relevant site characteristics or "evaluation factors", through decisions on how such factors affect site suitability ("scoring"), and finally how much importance a factor should have among other factors in the site selection process ("weighting"). Since most of these factors can be mapped across Long Island Sound and since bounded site parcels have not already been defined, GIS methods of map analysis can be used to facilitate the above progression and illustrate for all stakeholders the consequences of decisions made along the way.

There are two approaches to evaluating suitability of a particular spot or area. Some factors represent gradations of suitability which need to be weighed in relation to other such factors in arriving at a consensus. Other factors may be described as "fatal flaws" such as critical, unique habitats or presence of navigational aids. Presence of such a factor in a location immediately disqualifies the location from further consideration without need to evaluate its relative weight or importance.

In the example or "strawman" shown below, two possible gradational factors are shown mapped in LI Sound. To the left is shown a map of water depth (bathymetry) across LI Sound from 0 to approximately 80 meters. Depth has been compiled at a horizontal resolution of 500 meters, since this is likely to be smaller than any practical disposal site.

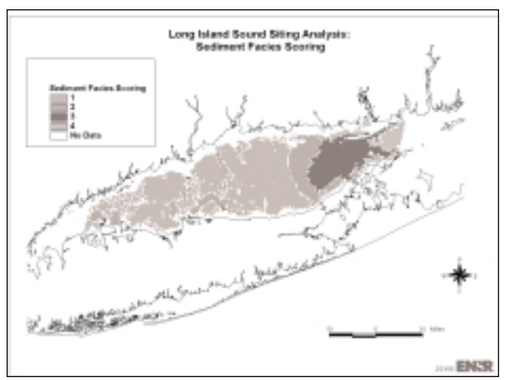


On page two is shown a map of sediment facies interpreted by USGS workers, ranging from still environments with fine-grained sediments (muds) to high energy environments with sands and gravels which are being actively eroded and transported elsewhere.



Identifying these two "factors" as being relevant to disposal site suitability is only one step in the decision-making process. Next comes a decision how each factor might affect site suitability. For example, it may be that deeper water is more suitable than shallow water. It may also be that fine-grained muds most similar to dredged sediments would be most suitable for disposal of such sediments.

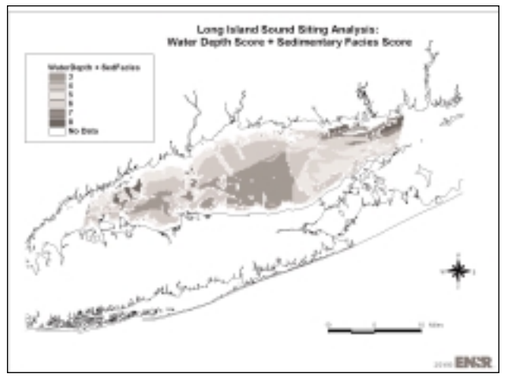
The next step is then to "score" each factor in terms of suitability.



Above is shown an example scoring for water depth, in which water more than 50 meters deep is scored "1" for most suitable, down to water shallower than 10 meters, scored "4" for least suitable.

Below is a similar scoring is applied to sediment facies, with "1" representing most suitable fine-grained depositional facies through "4" representing least suitable coarse-grained erosional facies.

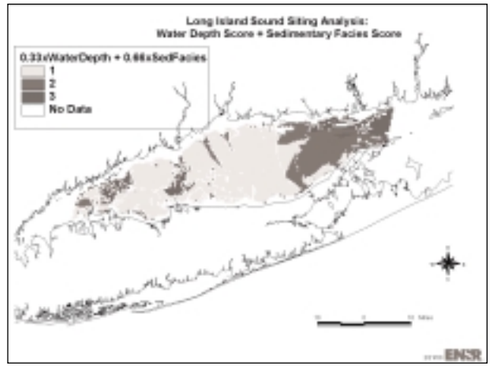
It is important to remember that similar numerical categories have been assigned to each factor, so that no decision has yet been made that one factor is more or less important than the other.



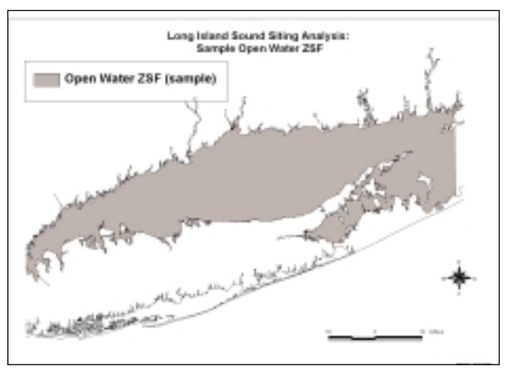
GIS analysis can now be used to combine the scores for the two factors within each 500 meter cell across LI Sound. In the results at left, each factor has been weighted equally, and the results color-coded from 3 "most suitable" to 8 "least suitable."

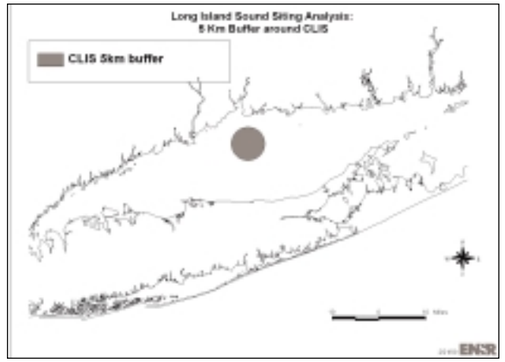
In th example above, only two factors have been combined, but the same method can be used to combine any number of different factors into one cumulative suitability score.

The figure below illustrates another cumulative suitability score map has been calculated, but this time the sediment facies score has been weighted or given an importance roughly twice that of the water depth score. This map is clearly different simply as a result of changing the relative importance or value accorded each factor.

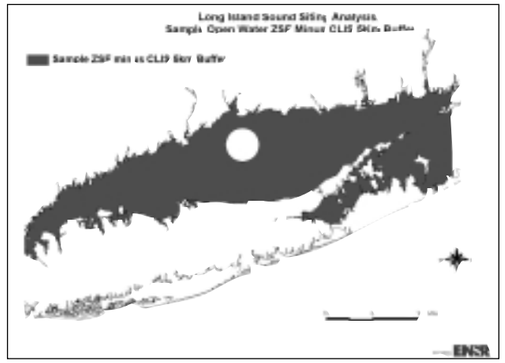


The figure below illustrates use of "fatal flaw" factors in restricting site suitability. An example "Zone of Siting Feasibility" (ZSF) for open water disposal is shown in green.





The figure above shows an example fatal flaw factor - a 5 kilometer buffer zone around the current Central LI Sound disposal site.



The map above shows the result of using GIS analysis tools to remove this buffer zone completely from the sample ZSF.